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An Introduction to Chainlink

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Chainlink is a decentralized data routing protocol that is built on Ethereum. Through a wide network of nodes, Chainlink facilitates the transfer of data from off-chain sources to on-chain applications, in what is commonly referred to as an oracle service.

Background

Smart contracts, such as those used on Ethereum, allow for the construction of secure and autonomous applications. But these applications can only be as effective and as accurate as the data that they are fed. The bridge that connects data between these autonomous applications and the outside world, is called an oracle. Typically these oracles are centralized services meaning that if an application is only as strong as its weakest link, a centralized oracle would likely be that weakest link and the single point of failure.

Chainlink is a decentralized oracle network that seeks to eliminate the central point of failure present in prior oracle solutions. Secure oracle networks are integral to the long-term functioning of decentralized marketplaces, a market segment that will facilitate trillions of value if it matches centralized systems. In many cases, these decentralized marketplaces require data that isn't native to the public blockchain where the marketplace exists. For example, this is evident in decentralized exchanges on Ethereum which facilitate the trading of derivative products. If the data fed into these products is corrupted, the markets for the investment products could also be corrupted. Applications including decentralized exchanges highlight why a centralized data feed could represent a central point of failure. If for some reason an oracle service is interrupted, by mistake or my malice, the applications that rely on that oracle would fail.

Chainlink's Approach

The Chainlink Network consists of three main blockchain components: oracle selection, data reporting, and result aggregation.[1]

- **Oracle Selection:** A user looking for data providers (oracles) specifies the requirements in a service level agreement ("SLA"). SLA parameters include the desired number of oracles, the desired reputation of the oracles, and the types of data requested. A reputation contract tracks service-provider performance metrics. Relevant provider metrics include: total number of assigned requests, total number of completed requests, total number of accepted requests, average time to respond, and total amount of penalty payments.

- **Data Reporting:** Once the SLA has been finalized, off-chain oracles execute and report data back to the Blockchain to be utilized by the user. Chainlink consists of a network of nodes that acts as a bridge between off-chain data and the Ethereum blockchain.

- **Result Aggregation:** Once the oracles reveal their results, an aggregating contract analyzes the results and reports to the reputation contract. Results are evaluated on the timeliness and correctness of data delivery. Detecting incorrect results is a unique problem for each data feed. For this reason, each purchaser may specify a customized contract to verify the data. These results feed into the reputation system which helps future users evaluate the data providers.

Practical Applications of Chainlink

Although the complexity of Chainlink's approach may seem like a major departure from conventional systems, we're already seeing Chainlink utilized by a number of prominent projects in the decentralized finance (DeFi) ecosystem which in aggregate currently facilitate billions of lending and exchange services. As an example, AAVE is a decentralized lending protocol where depositors earn interest by providing liquidity to a pool.[2] To ensure that lending rates are reflective of real-time changes in the market, AAVE uses Chainlink to gather pricing and rates from off-chain sources such as exchanges. Data is collected from a network of data providers that supply lending rates and market prices. This data is then aggregated into a weight-adjusted price which smart contracts can leverage to make loans. Additionally, LINK holders can use their tokens as collateral on the AAVE protocol.

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1. "ChainLink," September 4, 2017, https://link.smartcontract.com/whitepaper.
2. "Aave," Chainlink Ecosystem, June 2, 2020, https://chainlinkecosystem.com/ecosystem/aave/.

The figure below illustrates how Chainlink could be used to facilitate data transfer from prominent institutions and data providers to blockchain applications. While Chainlink is already one of the most used protocols, many believe that the adoption of decentralized application may have only just begun. With increased usage of decentralized applications, oracle services like Chainlink may become increasingly important.

FIGURE 1: **WHAT IS CHAINLINK?**[3]

LINK Token Use

The LINK token is the native token of Chainlink and is used to pay Chainlink node operators for oracle services. For a smart contract on Ethereum to use a Chainlink node, it will have to pay the node using LINK. Chainlink nodes may also stake LINK as collateral as a way of insuring the data delivery service. This collateral function is an optional feature of LINK that allows operators the ability to earn additional income.

When fully functional staking goes live, LINK may become an integral part of value accrual on the Chainlink network as fees will likely funnel towards those post collateral in LINK tokens.

Brief History of Chainlink

The project was created by SmartContract.com, a company founded in 2014 by Sergey Nazarov and Steve Ellis to create a bridge between external data and public blockchains. In 2017, SmartContract.com introduced Chainlink, a decentralized network aimed to link real world data and public blockchains by connecting smart contracts to off-chain data for markets, events, and payments.

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3. "What Is ChainLink? A Beginner's Guide to Decentralized Oracles," CoinCentral, April 4, 2018, https://coincentral.com/what-is-chainlink-a-beginners-guide-to-decentralized-oracles/.

The initial funding for Chainlink occurred in September 2017 when the Company raised $32 million by selling 350,000,000 LINK in an initial coin offering (ICO). In total, 1,000,000,000 LINK were issued.

Token Sale & Allocations

Unlike other digital assets such as Bitcoin, which are solely created through a progressive mining process, 1.0 billion LINK were created in connection with the launch of the Chainlink Network through an ICO that raised approximately $32 million. No further LINK can be created. LINK were distributed as follows in connection with the launch of the Chainlink Network:[4]
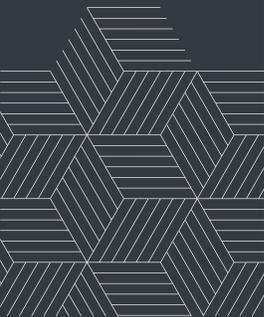
- **Initial Distribution:** 350 million LINK, or 35% of the supply, was sold in the ICO to investors.

- **Node Operators Pool:** 350 million LINK, or 35% of the supply, was reserved for Node Operators and for ecosystem rewards to fund any further development.

- **Company Allocation:** 300 million LINK, or 30% of the supply, was allocated to Chainlink's parent company, SmartContract.com.

Potential Risks

- **Competition -** Chainlink is the leading decentralized oracle provider and has become the de facto choice for DeFi applications. There are a number of other projects that are looking to take market share from Chainlink such as Band Protocol and Tellor. Band has partnered with some key players such as CoinGecko.

- **Decentralization -** There may be risks associated with the level of decentralization of the Chainlink network. If too many nodes are located in the same jurisdiction, they could be targets of censorship, weakened by natural disaster, or central points of attack.

- **Network economics -** The security of the Chainlink network is largely reliant on the economics of the system incentivizing productive behavior and penalizing unproductive behavior. Data providers need to be properly incentivized and the cost to the end user needs to be attractive.

- **Volatility -** Token volatility also has the potential to affect Chainlink economics and the security of the network.

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4. "Crypto Research, Data, and Tools," Messari Crypto News, https://messari.io/asset/chainlink/profile.

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- **Token Concentration -** At the time of writing, approximately 83% of the total supply is held in the top 100 addresses.

- **Regulatory -** The SEC has stated that certain digital assets may be considered "securities" under the federal securities laws. To date, the SEC has only identified two digital assets, Bitcoin and Ethereum, for which it does not intend to take the position that they are securities. As a result, any other digital asset, including LINK, is at risk of being deemed a security, which may have material adverse consequences for such digital assets.

Summary

Critical pieces of middleware infrastructure are necessary for decentralized applications to realize their full potential. A robust oracle service is one of those core pieces of infrastructure. Smart contracts will continue to require trusted data sources to ensure that applications are tamper-resistant. Chainlink offers the most robust oracle solution to date and has a large customer base using the network.

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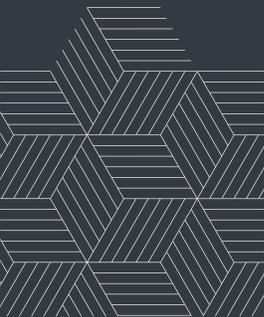
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